Abstract Submitted
for the APR10 Meeting of
The American Physical Society

Luke-warm dark matter: Bose-condensation of ultra-light particles MIHAI BONDARESCU, University of Mississippi, ANDREW LUNDGREN, Syracuse University, RUXANDRA BONDARESCU, Penn State University, JAYASHREE BALAKRISHNA, Harris Stowe State University — We discuss the thermal evolution and Bose condensation of ultra-light dark matter particles with Compton wavelength of galactic scales. Agglomerations of these particles form stable halo structures and naturally exhibit no small scale structure. They are supported against gravitational collapse by Heisenberg's uncertainty principle similar to boson stars. We find that these ultra-light scalars Bose condense at high temperatures. The condensate has a very high critical temperature allowing us to treat the ground state and excited states separately. The particles in excited states are ultra-relativistic and act like radiation, while the bosons in the ground state have the same effect on the universe as presureless matter. We then solve the Friedman-Klein Gordon equations and study the cosmological evolution of this scalar field.

Mihai Bondarescu
University of Mississippi

Date submitted: 22 Oct 2009 Electronic form version 1.4